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STATISTICAL OBSERVATIONS *relative to the GROWTH of the HUMAN*
BODY (*Males*) in HEIGHT and WEIGHT, from EIGHTEEN to
THIRTY YEARS of AGE, as illustrated by the Records of the
Borough Gaol of Liverpool. By J. T. DANSON.

VERY little is yet known, with any degree of certainty, of the average height, or weight, of either men or women, in this country, when at maturity. Still less is known as to the precise age at which, as a rule, maturity, so far as it is indicated by a cessation of increase in height, or weight, or both, is attained, by either sex. Yet there is some value, undoubtedly, in this knowledge. It is a very long time since, by a rule purely empirical, we fixed upon twenty-one years complete as the age at which a man shall, in this country, be deemed fit to take care of himself, and be deemed fully responsible for his actions. This rule assumes something more than mere physical maturity. But this description of maturity is so obviously the basis of every other, and any inquiry touching intellectual or moral maturity is attended with so much more difficulty, that our science, while gradually supplying a scientific basis for rules thus empirically founded, is clearly called upon to deal first with physical maturity. Of this, height and weight are the most obvious, if not the best indications. Physical maturity has also considerable importance with reference to the military strength of a nation; and in this point of view it is desirable that we should be able to compare our male population with that of other nations.

M. Quetelet, in his work "*Sur l'Homme*," has given some information on the subject, as regards his own country (Belgium). But that country cannot be taken as indicating the condition of any other; and, if it could, the number of individuals measured and weighed by M. Quetelet, or by those whose figures he adopts, seems too small to warrant much reliance on the conclusions to which they have conducted him. For instance, for ascertaining the relative height of the two sexes, at birth, he relies upon the measurement of fifty individuals of each sex, taken at the Foundling Hospital at Brussels. I cannot but regard this number as insufficient to found any conclusion, even as to the Belgian population. It is hardly sufficient to indicate the average of a single year, in one city, and in one class of the population. Nor in this, as in many other instances which might be cited from the work in question, can I suppose that M. Quetelet intended to do more than barely commence, and give examples, and that rather of

the direction than the method, of such inquiries. That an average of height or weight, applicable to any considerable number, cannot be safely deduced from so few as fifty individuals, I shall presently be able to show.

In afterwards tracing the progressive increase of height, for each sex, at each year of age, M. Quetelet omits to state from how many individuals of each age his figures were obtained. And when we reflect how much easier it must be to examine a large number of infants at a foundling hospital, with a precise knowledge of the age of each, and the fullest opportunity of applying an uniform mode of measurement, than to examine, with anything like equal accuracy, the same number of persons at each year of age, subsequently, up to twenty years, I think we are justified in inferring, in the absence of all information on the subject, that the number so examined by M. Quetelet, at each subsequent age, was less than fifty, and was, in all probability, not uniform at successive ages.

Again, in comparing, as to height, the inhabitants of the towns of Brussels, Louvain, and Nivelles, with the inhabitants of the surrounding country, it appears that the figures were obtained by extracting from the militia register, taken at the age of 19, for Brussels, the heights of 400 individuals, and for the rural parishes near that city, the same number. For each of the other two towns, 150 were taken from the urban, and the same number from the suburban register. Here, however, we are met by the suggestion that the men measured, being marked for military service, were to some extent of a select class, and did not fairly represent the entire male population of the same locality.

The largest basis of induction used by M. Quetelet, as to the height of the human body, appears to be one obtained by extracting from "the registers of a great levy" made in Brussels "about eighteen years ago, the recorded heights of 300 individuals (we may presume "all males) at 19 years, 300 at 25 years, and 300 at 30 years of age." The work in which these figures appear having been published in 1835, the data of the registry ("eighteen years ago") would run back to 1826 or 1827. The purpose of the levy is not stated. Nor are we told what, in point of precision, or of uniformity, were the methods used to obtain the heights of those measured. Nothing is said of their weight.

Holding the opinions I have just expressed, I was struck, some time ago, when visiting the New Borough Gaol of Liverpool, with the fulness, the uniformity, and the apparent precision of the record there made, from day to day, and preserved, of certain particulars touching each prisoner entering and leaving the gaol, who is committed to it under sentence of imprisonment for one month or more. With the permission of the Governor, I carefully examined these

records, and also the means used for obtaining the height and weight of the prisoners, and thus became convinced that we have there materials adapted for extending, in some degree, and on a safe basis, the knowledge we yet possess of this subject. I then obtained the requisite authority, and with the obliging aid of the Governor, and of the clerk in charge of the books, I had drawn up an account of each male prisoner who had entered the gaol in the two years extending from the 1st of April, 1857, to the 31st of March, 1859, inclusive. This account states, as to each—

1. The date of entry.
2. The age.
3. The height.
4. The term of imprisonment.
5. The weight on entering.
6. The weight on leaving, and
7. The degree of instruction.

Prisoners committed for less than a month are not measured or weighed.

The height and the weight are taken with apparatus constructed for the purpose, by well-known makers, and which appears to answer the purpose well : giving the height to a quarter of an inch, and the weight to a pound. The height and weight are taken at the same time, in the same place, and by the same person ; and they are always taken in the same way ; and, with few exceptions, the figures recorded during the two years in question were obtained and recorded by the same officer, whose character, intelligence, and long practice, afford a strong guarantee for the general accuracy of his work.

The only particular, among those thus recorded, as to which any material doubt of its accuracy can exist, is the *age* of the prisoners. In obtaining this, the officer relies upon three distinct sources of information, no one of which is conclusive, but which taken together afford the best indication attainable. These are, (1) The statement of the prisoner ; (2) His appearance ; and (3) Any previous acquaintance the officer may have had with the prisoner. This previous acquaintance is, in many instances, considerable. A large proportion of the prisoners belonging to a so-called "criminal class," the members of which are very generally known to the police, and usually continue so for some years. The appearance affords but a rough guide, but it is worthy of some reliance at the ages to which I am about to ask your attention, seeing that at these ages the lapse of a given time is generally attended with a greater change of appearance than at any subsequent age. The statement of the prisoner can be relied upon only so far as his knowledge may extend ; and there are, undoubtedly, many men in the class from which chiefly these prisoners are taken who do not know exactly their own age. On

the other hand, there is, with one exception, which I will notice presently, no apparent inducement on the part of the prisoner, to misstate this fact. The exception arises thus: when boys pass 16 years of age they are allowed the increased diet awarded to "men," as distinguished from "boys." Attempts to obtain this increase, by overstating the age, have been detected; and it is not improbable that they have sometimes passed without detection. But the earliest age as to which I now use these records being 18, this is not likely to have affected them materially for the present purpose. In other respects I am disposed to infer that the ages, as here stated, are quite as worthy of reliance, on the whole, as the ages of males obtained by the census of the population at large.

The total number of prisoners as to whom these particulars were obtained was upwards of 4,800.

The number entering in the first of the two years was 2,526; and of this number 1,563 were of the ages from 18 to 30 inclusive.

Observing that the highest uniform number I could take at each of the thirteen ages, from 18 to 30 inclusive, from the returns of the two years, would be 100—indeed the whole number at one age (29) being only 95—I began, with that number to construct the following table. At the ages 23, 24, and 25, I found the results not progressive—the first 100 taken at each age giving the average heights thus—

At 23 ..	5	6·38
„ 24 ..	5	5·92
„ 25 ..	5	6·6

These being ages at which the prisoners were more numerous than at others, I increased the number from which the average was taken. The whole number at 24, was 185; and I took the average on this number. At the age of 27 also, I took 138, being the whole number at that age.

The table then stands thus:—

Height.

Age.	Number taken for Average.	Average.		Maximum.	Minimum.	Maximum over Average.	Minimum under Average.	Maximum over Minimum.
		ft.	in.	ft. in.	ft. in.	in.	in.	in.
18.....	100	5	4.34	5 11	4 10 $\frac{1}{2}$	6.66	5.84	12 $\frac{1}{2}$
19.....	100	5	4.94	5 11 $\frac{1}{2}$	4 11	6.56	5.94	12 $\frac{1}{2}$
20.....	100	5	5.11	5 11	5 1	5.89	4.11	10
21.....	100	5	5.57	5 11 $\frac{1}{4}$	5 $-\frac{3}{4}$	5.68	5.07	10 $\frac{3}{4}$
22.....	100	5	6.17	6 1	5 $-\frac{1}{4}$	6.83	5.92	12 $\frac{1}{4}$
23.....	200	5	6.17	6 1	4 11	6.83	7.17	14
24.....	185	5	5.94	6 1	4 9	7.06	8.94	16
25.....	200	5	6.30	6 —	4 11	5.77	7.30	13
26.....	100	5	6.28	6 1 $\frac{3}{4}$	4 9 $\frac{1}{2}$	7.07	8.78	16 $\frac{1}{4}$
27.....	138	5	6.38	5 11 $\frac{3}{4}$	5 1	5.37	5.38	10 $\frac{3}{4}$
28.....	100	5	6.65	6 1	5 1	6.35	5.65	12
29.....	95	5	7.02	6 $-\frac{1}{2}$	5 1 $\frac{1}{2}$	5.48	5.52	11 $\frac{1}{2}$
30.....	100	5	6.36	6 1	5 $-\frac{3}{4}$	6.64	5.51	12 $\frac{1}{4}$

Here it is obvious that the results do not indicate a progressive increase in height. For instance, the average height of 185 men at 24, is less than that of 200 men at 23; and 100 at 26 give a lower average than 200 at 25; while 100 at 30 give a lower average than 95 at 29. Yet these are the best results attainable from two years of such observation as is afforded by the records of one of the largest gaols in the kingdom, and where the basis of induction for the average height at each age is much larger, and, I venture to think, far more trustworthy than any hitherto employed.

Here we have to remember that we proceed on the assumption that in the same locality the men attaining (say) 25 in a given year cannot have a less height than the men who shall attain 25 in the year preceding or following. But this may not be so. We learn from the records of the French conscription, that, in that country, of every 1,000 men examined annually at 20 years of age as to their fitness for military service, a considerable number are found to be below the height fixed as a minimum. But this number is not always the same, nor even nearly the same; and there is good reason for supposing that if the whole number of young men who annually reach the age of 20 years in that country, and thus become liable to the conscription, were measured, and their average height ascertained, it also would be found to vary from year to year. An attempt was made some years ago by M. Millot, a French statist, to show that the years of remarkable deficiency in the height and other military requisites of the conscripts coincided with birth-years in which the cost of food had been unusually high. But, whatever the causes of these variations, it is all but certain that they exist, and that, consequently, the most extensive and perfect measurement of individuals of different ages, at

the same time may be expected to yield results partaking more or less of the irregularity exhibited in the above table. I need scarcely add that the data relied upon by M. Quetelet become, in this point of view, so much the more open to objection.

I may observe that the Belgian observations of M. Quetelet give an average height, for men at 18 years of age, of 1·658 metres, or 5 feet 5·27 inches, or about $\frac{4}{5}$ ths of an inch more than the above table. But at 30 years of age M. Quetelet gives 1·684 metres, or 5 feet 6·29 inches, while the above table gives 5 feet 6·36 inches. So that the Englishman would appear to be, at 18, considerably shorter, and at 30 somewhat taller, than the Belgian. Also, the Belgian would appear to want at 18 only about 1 inch of his full height, while the Englishman wants fully 2 inches.

I may here observe, that the minimum height of recruits for the French army, taken at 20 years of age, is 1·560 metres, or a little less than 5 feet 1½ inches; and that of every 1,000 conscripts examined in the five years from 1836 to 1840, no less than 97, or nearly 10 per cent., were rejected for not reaching this height. Of the first 200 of the Liverpool prisoners taken at this age only three were found short of this height. Again, the average height of the whole French army, which is computed annually, is said to have varied during nine years (1835-43) between a maximum of 1·664 metres and a minimum of 1·659 metres. The common average may be taken at 5 feet 5½ inches, which is about 1 inch shorter than the average of the 1,418 Liverpool prisoners comprised in the above table, from 20 to 30 years of age inclusive.

The following table of average weights at the same ages, 18 to 30, shows a similar irregularity. At the age 25 the weight seems excessive; and at ages 24, 26, 28, and 30, it seems deficient.

Weight.

Age.	Number taken for Average.	Average.	Maximum.	Minimum.	Maximum over Average.	Minimum under Average.	Maximum over Minimum.
		st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.	st. lbs.
18.....	100	8 10·79	10 13	6 6	2 2·21	2 4·79	4 7
19.....	100	9 4·11	12 8	7 4	3 3·89	2 0·11	5 4
20.....	100	9 5·58	12 8	7 13	3 2·42	1 6·58	4 9
21.....	100	9 5·02	12 0	7 3	2 9	2 2	4 11
22.....	100	9 12·41	13 2	7 -	3 2·59	2 12·41	6 1
23.....	100	10 2·95	12 12	7 12	2 9·05	2 4·95	5 0
24.....	100	10 2	12 12	7 12	2 10	2 4	5 0
25.....	100	10 5·65	13 8	8 2	3 2·35	2 3·65	5 6
26.....	100	10 1·06	13 8	6 12	3 6·94	3 3·06	6 10
27.....	100	10 4·75	13 10	7 12	3 5·25	2 6·75	5 12
28.....	100	10 2·62	13 2	7 7	2 13·28	2 9·62	5 9
29.....	95	10 5·53	13 12	8 4	3 6·47	2 1·53	5 8
30.....	100	10 1·55	14 1	8 1	3 13·45	2 0·55	6 0

The conclusions I have arrived at, and which I submit to the Society are :—

1. That the inquiry apparently made by M. Quetelet was insufficient to ascertain the average height of men, at any age, in the localities he refers to, inasmuch as the numbers measured were too small.

2. That the number measured to ascertain the average height or weight of men should include a much larger proportion of the class whose height or weight is sought, than has been used in framing the above table, or than is commonly supposed to be necessary. And

3. That there is good reason for supposing that even among men of the same class, and the same habits, in the same locality, those who attain a given age in one year have not the same, or very nearly the same, average height or weight, as those who attain the same age in years preceding or following.
